Results. Radiation mucositis at least of the grade 2 (patchy stage) has been observed in all (100%) pts, usually beginning from the 11th day (range: 6-21). The confluent mucositis (grade 3) has noted in 87 pts (98%) with the median onset at 14th day (range: 6-39). Reaction of grade 4 (confluent mucositis occupying more than 50% of radiated mucosal area – CME>50) has been detected in 71 pts (81%) with the median appearance at 21st day (range: 9-42), remaining usually 24 days (range: 2-45) notwithstanding below or equal 7 days in 15 pts (21%). The incidence and duration of CME>50 has correlated significantly with the type of fractionation – 88% of pts treated by AF and HF developed CME>50 which took about 28 days, compare respectively to 77% of pts and 19 days for CF. Also the site of CME>50 origin (oral cavity+pharynx vs. larynx+hypopharynx) was connected significantly with its incidence and duration – 25th vs. 20th day and 25 days vs. 19 days, respectively. The most important factors associated directly with the time of mucosal healing were duration of mucositis and its supportive treatment, maximal total score, accumulated radiation dose (ADR), area of boost fields and total radiation dose, but adversely – onset of dysphagia and onset of mucosal oedema. The overall duration of mucosal reaction (i.e. time from the first day of irradiation up to its complete healing) was significantly connected directly with duration of mucositis and its supportive treatment, areas of radiation fields (initial, shrinking and boost), total dose, overall radiation treatment time (ORTT) and maximal total score, but adversely with site of reaction origin and with ARD. Finally, the prediction models of several mucosal reaction end-points have been created on the base of multiple regression function. The increasing number of symptoms (variables) collecting as the monitoring progressed has improved the fit of prediction model for crucial end-points, like duration of mucosal healing, overall duration of mucosal reaction, duration of CME>50 and maximal total score. The highest adjusted goodness-of-fit values (adR2) for prediction models estimated at the end of radiation treatment have reached at best to 0.75 (usually were ~0.5), what could meant at least 50% variability of that reaction depends on individual radiosensitivity of mucosal membrane.

Conclusions. 1. High rate of mucositis grade 4 during conventional fractionation, reaching 75%, has been in contrast with general opinion of its lower, 25% rate. Methodology of this study and relatively high proportion of patients (~20%), who experienced such a grade within a very short time (up to 7 days), suggests however, that literature data could be underestimated. 2. In spite of noted, well-known tendency that AF has prolonged the time of mucosal healing (on 7 days); the overall duration of mucosal reaction has been adversely influenced by ORTT and ARD, what has given per saldo 1 week shorter reaction for AF. It suggests that radiation-free weekends during CF are not thus important for mucosal healing like it has believed. The overall duration of mucosal healing in 5 fractions per week treatment is longer than for 7 fractions per week, provided that ARD does not exceed 12.6Gy per week and radiation fields delivered during the weekends are relatively small. 3. Frequent and careful monitoring of the whole course of radiation mucosal reaction seems to be essential for individual prediction of its severity and healing. This procedure claims to be clinically useful especially for aggressive altered fractionation or concomitant chemo-radiotherapy, i.e. for those therapeutic methods where traditional reporting on radiation mucosal toxicity has been neglected.

162.
IS INTENSITY MODULATION USEFUL IN RADIOSURGERY? AN ANALYSIS OF CLINICAL APPLICATIONS OF IMRS

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Introduction. Treatment modalities based on single fraction delivery demand

applying techniques that allow sparing critical tissues and appropriate dose distribution in planning target volume. The most attractive seems to be Intensity? Modulated Radiosurgery (IMRS). IMRT is a treatment modality that uses varying energy fluence across the field to assure better conformity and steeper dose gradients than techniques based solely on geometric field shaping. The indications for its use are still discussed, especially in conjunction with stereotactic radiosurgery. Objective. The aim of our study was to analyze treatment plans in order to find the most frequent situations when intensity modulation was used and, thus, to determine the possible indications for IMRS.

Material and Methods. Thirty-three treatment plans of IMRS of 220 made for radiosurgery between October 2001 and February 2003 were analyzed.

Results. IMRS was most commonly used when target volume was localized in the vicinity of organs at risk (17 cases – 51%). In 7 of these cases the need for intensity modulation was caused both by the necessity of sparing organs at risk and geometric complexity of irradiated volume. In 15 cases (45%), including the mentioned above, complex shape of target volume was the reason of intensity modulation application. In 4 cases (12%) – multiple target volumes (2-4) – in brain metastases and bifocal recurrence of malignant glioma. In 3 cases (9%) - dose escalation within the irradiated volume (boost on gross tumor volume inside the PTV). In two cases the use of intensity modulation was the only way to obtain optimal dose distribution in the target volume of simple shape, located away of organs at risk

Conclusions. Intensity modulation in radiosurgery is a very attractive option when there is a need for irradiation volumes close to organs at risk. It is also useful when "conventional" conformal techniques cannot assure optimal dose distribution in target volumes of complex shapes. Finally, it is a convenient way to boost gross tumor volume inside the PTV when prescribed dose is delivered in single fraction.

163.
RADICAL RADIOTHERAPY FOR MUSCLE-INVASIVE BLADDER CANCER: THE INFLUENCE OF TOTAL RADIATION DOSE AND OVERALL TREATMENT TIME ON DISEASE OUTCOME.

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Purpose: To assess the influence of total radiation dose, overall tratment time and other clinical factors on treatment outcome for muscle-invasive (T2,T3) bladder cancer patients, treated with radical radiotherapy.

Material and methods: Between 1975 and 1995, 480 consecutive patients with T2, T3 bladder cancer were treated with radical radiotherapy. During that period various fractionation schedules were used: 1. conventional fractionation (once a-day, 1.8-2.5 Gy/fraction; OTT-53 days), 2. protracted fractionation (once a-day, pelvis- 1.6-1.7 Gy/fraction, boost- 2.0 Gy/fraction; OTT-62 days), 3. accelerated hyperfractionated boost (pelvis- once a-day, 2.0 Gy/fraction; boost- twice a-day, 1.3-1.4 Gy/fraction; OTT-45 days), 4. accelerated hyperfractionation (pelvis and boost- twice a-day, 1.2-1.5 Gy/fraction; OTT-41 days). For the whole group of patients mean total dose and mean overall treatment time were: 65.5 Gy and 51 days, respectively. Maximum-likelihood logistic model and Cox proportional hazard model were used to evaluate the role of total dose, overall treatment time, T-stage, hemoglobin level and bladder capacity before radiotherapy. The median follow-up was 76 months.

Results: Five-years actuarial local control rate was 47% and overall survival rate was 40%. Logistic model including total dose, overall treatment time and T-stage revealed that all those factors significantly influenced local control probability ($p=0.021$ for TD, $p=0.038$ for OTT and $p=0.00068$ for T-stage). When other clinical factors and tratment-related parameters were analysed in Cox